From: Tina Laidlaw
To: Suplee, Mike
Subject: Re: TDG, Yellowstone
Date: 01/18/2013 08:18 AM

Mike,

Thanks for sharing your draft paragraph.

Without TDG results being included in the report (in tables 13-4 and 13-5), I can't really evaluate if TDG should replace pH and chl-a as the primary endpoints for setting nutrient criteria. The results don't have to be in the table but could you point me to them somewhere in the report (or in a separate file)? Currently, I really don't have much to use to evaluate the TDG results b/c all I could find was the summary text. Am I missing something and do I just need to dig into the report more?

From the sentence you added, it seems to me that TDG could end up being a driver for criteria if a strict interpretation of the WQS was applied? For example, what are the TN and TP concentrations associated with the TDG value of 119%? If those values are close to or (better yet), less than the proposed criteria then we can just work on wordsmithing.

Let me know if you want to meet and show me TDG results if that would be easier. Sorry for all of the questions. Give me a call if you'd prefer to chat.

Tina

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▼ "Suplee, Mike" ---01/17/2013 12:14:42 PM---Hi Tina; Went back through the model runs, calculated TDG for critical endpoints, and have rewritten

From: "Suplee, Mike" <msuplee@mt.gov>
To: Tina Laidlaw/MO/R8/USEPA/US@EPA
Date: 01/17/2013 12:14 PM
Subject: TDG, Yellowstone

Hi Tina;
Went back through the model runs, calculated TDG for critical endpoints, and have rewritten the TDG section (13.3.5) as shown below. Please let me know if this will be adequate for the EPA tech review.

Thanks, Mike

State law requires that induced TDG remain below 110% of saturation (**Table 4-3**) to protect fish from gas bubble disease. However, the standard is more intended to control supersaturation of atmospheric gas below dam spillways. In the Yellowstone River, gas supersaturation is driven predominantly by diel DO changes. A thorough literature review on gas supersaturation effects on fish (Weitkamp and Katz, 1980) shows that fish are tolerant of higher total gas levels than reflected in the state's standard provided that the gas pressure is being driven by biogenic oxygen. For example, fish are shown to develop gas bubble disease only when DO saturation levels reach 300%. When the supersaturation effect is intermittent, as it is in the Yellowstone River, the negative impact on fish is greatly reduced. DO supersaturation levels observed in our highest nutrient-addition model runs were never greater than 175% of saturation, which equates to 119% saturation for TDG—assuming an elevation-based barometric pressure at Miles City of 695 mm Hg and assuming 100% saturation of atmospheric nitrogen + argon gas. At the nutrient concentrations we are recommending to keep pH below 9.0, DO saturation is 143% of saturation, which equates to 112% TDG (same assumptions as above) and is very close to the state's standard. Given that the supersaturation effect is caused by DO which will remain far below 300% saturation, is intermittent, and is just 2% above the state's TDG criterion, we contend that the nutrient criteria recommendations will be protective.